Mid-infrared Steering Committee Recommendations

This document contains the charter for the Mid-infrared Steering Committee (MISC), that committees' recommended Mid-infrared Instrument (MIRI) functional requirements, and a proposed division of labor between NASA and ESA for the construction of the MIRI.

MISC Charter

NGST (Next Generation Space Telescope)
Mid Infrared Steering Committee (MISC) Charter

Appointment and Reporting

The MISC is appointed by and reports to the NGST program scientist at NASA headquarters and the NGST project scientists at Goddard Space Flight Center and the contributing institutions (ESA, CSA, and other European sponsors). The duration of the appointment will be until other groups replace the MISC.

General Purpose

Members of the MISC will work with the NGST project scientists at Goddard Space Flight Center and ESA and CSA to develop top-level functional requirements and a preliminary instrument design concept for a mid-infrared (5-28 microns) instrument for NGST. See document http://www.ngst.nasa.gov/cgi-bin/doc?Id=778 for details of the recommendation from the Mid Infrared Partnership Planning Group (MIRPPG).

The MISC will also work with these agencies to develop an international partnership plan including a preliminary NASA/ESA work breakdown structure (WBS). Using this WBS, the agencies will develop a project plan, allocating responsibilities, estimating resources, and establishing schedules. It is their intention to develop a roughly 50-50 division of effort between ESA and NASA, with the CSA contribution not yet decided.

NASA is considering various options to carry out its responsibilities, including the assignment of the instrument to a NASA field center with a competitively selected science team. ESA has a formal process for developing a consortium, based on the instrument concept and work breakdown structure.

Deliverable Items

1. Define minimum functional requirements. Recommended requirements were developed by the NGST ASWG and reported in http://www.ngst.nasa.gov/cgi-bin/doc?Id=549. The MIRPPG also recommended requirements, which are

somewhat more ambitious than those of the ASWG. The MISC should resolve any discrepancies in their recommendation. A one-page statement would be sufficient.

2. Deliver instrument concept for NASA HQ approval by 7/15/01. A three-page statement would be sufficient. Note that design and operations simplicity are highly valued by NASA.

3. Review NASA/ESA Work Breakdown Structure as needed.

4. Assist with science-sensitive trade studies as needed.

Financial Support

Each space agency is responsible for arranging financial support for its members of the MISC. The level of effort has not yet been determined and is subject to negotiation following initial meetings.

MISC Membership

U.S. Members

Thomas Greene, NASA/Ames Research Center
Margaret Meixner, University of Illinois
George Rieke, University of Arizona (Chair)
Gene Serabyn, JPL

ESA Representatives

Fabio Bortoletto, Osservatorio Astronomico, Padova
Thomas Henning, Friedrich-Schiller-Universität, Jena
Pierre-Olivier Lagage, Service d'Astrophysique at CEA Saclay
Gillian Wright, Royal Observatory, Edinburgh

CSA Representative

Sun Kwok, University of Calagary

MISC recommendations

Key Science Goals

- Study first generation galaxies :
  - Hα & other optical lines for $z > 6$, near-IR diagnostics for $z > 1.5$.
  - Hidden star formation at high z
    - near IR features (Brackett lines, PAH features) for redshifts
    - agn/starburst discrimination
    - redshifts in faint galaxies from colours
  - CO band at 2.3um(rest) for stellar populations and kinematics.
- Study the youngest stars :
  - the youngest population will only be detected at 25μm
  - giant planets and brown dwarf atmospheres
  - disk structure and evolution of planets : gas vs. dust evolution, chemical evolution

Proposed Functional Requirements

- Wavelength range 5 - 28 μm
  - at least 25μm essential, ideally to 28.2μm to use fundamental H_2 line as diagnostic for star/planet/ disk formation studies.
- Imaging with pixels sized to take advantage of the NGST diffraction limit over as wide a field of view as possible. Field ~ 2 x2 arcmin. Pixel size ~ 0.12 arcsec.
- Coronographic Mask
  - for star /planet studies
- Spectroscopy R ~ 100 for ~ 5-10um
  - background limit for redshift determination in extremely faint high redshift galaxies
- Integral field spectroscopy, R~ 1000-2000, pixel sizes ~0.2 and ~ 0.4 arcsec, field of view >~ 2 x 2 arcsec.
  - kinematics in galaxies
  - resolve narrow lines in starformation studies, weak lines on strong continua, disk evolution, chemistry
  - higher R “would be nice”
- Lifetime 10 years

NASA/ESA Work Breakdown

NASA Field Center	European Consortium	ESA
Overall project management Overall systems engineering System I&T Overall flight software Detector subsystem - Detectors - Control electronics ISIM I&T support Observatory I&T support Science center interface - Documentation - On-orbit check out - Calibration GSE TBD	Optics subsystem - Subsystem design - Optics components - Optical bench - Stimulators TBD - Subsystem I&T Mechanism subsystem - Subsystem design - Mechanism development - Interface electronics - Control software object - Subsystem I&T System I&T support GSE TBD	Cryostat subsystem GSE TBD

MISC Final Report

The final study report from the MISC may be found online at http://www.ngst.nasa.gov/cgi-bin/doc?Id=943.